NEW SPECIES OF BLACK CORAL (CNIDARIA: ANTHOZOA: ANTIPATHARIA) FROM THE CARIBBEAN

Dennis M. Opresko

ABSTRACT

Two new species of antipatharian corals (Cnidaria: Anthozoa: Antipatharia), are described from the Caribbean region. *Antipathes caribbeana* new species forms large bushy irregularly branched colonies with long, straight or slightly curved, distally inclined branchlets. Its axial spines are typically conical to subcylindrical, laterally compressed, and covered with conical or knob-like tubercles over half to three-fourths of their surface. The species resembles *Antipathes salix* Pourtalès in branching pattern but differs in having shorter, wider spines with more numerous surface tubercles. *Antipathes umbratica* new species forms small irregularly branched colonies with straight branchlets set at very wide angles. Its axial spines are triangular, acute, laterally compressed, and covered with small, knob-like, or flattened and elongate tubercles over about half their surface.

The antipatharian corals of the deep reefs of the Caribbean region have become increasingly well known with the continuing popularity of recreational SCUBA diving and with the publication of new field guides containing detailed descriptions of these animals (Humann, 1993). Scientific research on these economically valuable corals, however, has been very limited, and several common species have remained undescribed. This report utilizes the large research collections of the Rosenstiel School of Marine and Atmospheric Sciences (RSMAS), University of Miami, and the National Museum of National History (USNM), Smithsonian Institution, to describe two new species that are found throughout the region.

Order ANTIPATHARIA
Family ANTIPATHIDAE
Genus *Antipathes* Pallas

Antipathes caribbeana new species
Figures 1–3, 4A–C, 5

Holotype.—USNM 94387, Jamaica, Discovery Bay, 38 m, W. Goldberg, August 1971.

Paratype.—USNM 52200, British Virgin Islands, off Indian Rocks, Pelican Cay, 45 ft (13.7 m), D. and J. Randall, April 23, 1961.

Other Material Examined.—Jamaica, Discovery Bay, 54–60 m, T. Goreau, Dec. 23, 1964, 1 spec. (RSMAS).—Jamaica, Discovery Bay, T. Goreau (no other data), 1 spec. (RSMAS).—Jamaica, Runaway Bay, 100 ft (30.5 m), T. Goreau, June, 1961, 1 spec. (USNM 94380).—Bahamas, off Nassau, 60–75 m (no other data), 1 spec. (RSMAS).—Puerto Rico, off Mona Id, 25 m, L. Craft, Nov. 18, 1972, 1 spec. (RSMAS).—U.S. Virgin Islands: St. Croix, Salt River Bay, 29 m, P. Colin, Oct. 11, 1972, 2 spec. (RSMAS).—U.S. Virgin Islands, off St. Johns, J. Beets, no other data, 1 spec. (USNM 94384).—Dominica, Prince Rupert Bay, 15–22 fm (27–40 m), BREDIN Expedition, Sta. 60-56, March 28, 1956, 1 spec. (USNM 94381).—Barbados, off Holetown, 30 m, P. Colin, July 1972, 1 spec. (RSMAS).—Colombia: Baja Mangles, off Islas de San Bernardo, 09°47′33″N, 75°45′00″W, 25 m, J. A. Sanchez, March 23, 1991, 1 spec. (USNM 94383).—Colombia, off Islas de San Bernardo del Viento, 80 ft (24 m), D. Torrez, July 31, 1991, 1 spec. (USNM 92975).—Colombia, off Islas Tesoro, 10°04′10″N, 75°44′75″W, 15 m, J. Sanchez, 1 spec. (USNM 94379).—Panama: off Buena Ventura, 11 m, T. Williams, April 9, 1967, 1 spec. (USNM 94382).—Panama off Bello Harbor, 9°33′N, 79°41′W, 12–13 m, (USNM 94386).—Panama, Atlantic coast, Williams, 1966, no other data, 1 spec. (USNM 94382).—Honduras, off Isla de Roatan, 27 m, P. H. Humann, July, 1992, 1 spec. (USNM 92276).—Honduras, 16°00′N, 86°10′W, 49 m, R/V Pillsbury Sta. 622, March 21, 1968, 1 spec. (RSMAS).—Honduras, 15°59.5′N, 86°02.5′W to 15°59.5′N, 86°01.0′W, 27-35 m, R/V PILLSBURY Sta. 625, March 21, 1968, 1 spec. (RSMAS).—Honduras, 15°57.6′N, 86°09′W to 15°58′N, 86°10′W, 35–41 m, R/V

Figure 1. *Antipathes caribbeana*: in situ photograph taken on the west side of Salt River Canyon, U.S. Virgin Islands, at a depth of about 100 ft. Photo: P. Colin, Oct., 1972.

PILLSBURY Sta. 626, March 21, 1968, 1 spec. (RSMAS).—Honduras, 15°58.2′N, 86°09.0′W to 15°58.0′N, 86°10.0′W, 40 m, R/V PILLSBURY Sta. 629, March 21, 1968, 1 spec. (RSMAS).—Belize, off Glovers Reef, 35 m, D. Karbowski, 1 spec. (RSMAS).—Belize, 16°02.1′N 88°31.8′W to 16°03.8′N, 88°34.1′W, 18–30 m, R/V PILLSBURY Sta. 614, March 14, 1968, 1 spec. (RSMAS).—Mexico, off Cozumel, 55–92 m, W. A. Starck, Nov. 3, 1968, 1 spec. (RSMAS).

Diagnosis.—Colony large, often exceeding 1 m in height (Fig. 1); densely and irregularly branched, with branches and branchlets projecting upward and outward. Smallest branchlets (Fig. 2A) straight or slightly curved, usually 0.15–0.30 mm in diameter (excluding spines), and up to 10 cm or more in length without becoming branched; distal branchlet angles mostly 30–45°. Branchlets arising from all sides of lower order branches but occasionally uniserial over short distances.

Spines conical to subcylindrical in appearance (Figs. 3, 4A–C, 5), laterally compressed, acute or slightly rounded apically, flared out along distal and proximal edges at junction with axis, and covered over apical one-half to three-quarters of surface with small, knob-like or cone-shaped tubercles. Spines unequal in size around circumference of axis; polypar spines larger than abpolypar spines. Polypar spines 0.08–0.16 mm from apex to midpoint of base; abpolypar spines 0.06–0.12 mm. Polypar spines perpendicular to branchlet axis (Fig. 3B) or slightly inclined distally (Fig. 3E). Abpolypar spines usually inclined distally, with proximal edge distinctly longer than distal edge. Narrow, conical, secondary spines developing on branches 0.4 mm or more in diameter. On thickest branches, primary and secondary spines relatively uniform in size and appearance, usually smaller than largest spines on branchlets, and often strongly inclined distally.

Spines on branchlets arranged regularly in 9–11 axial rows, with 25–35 spines

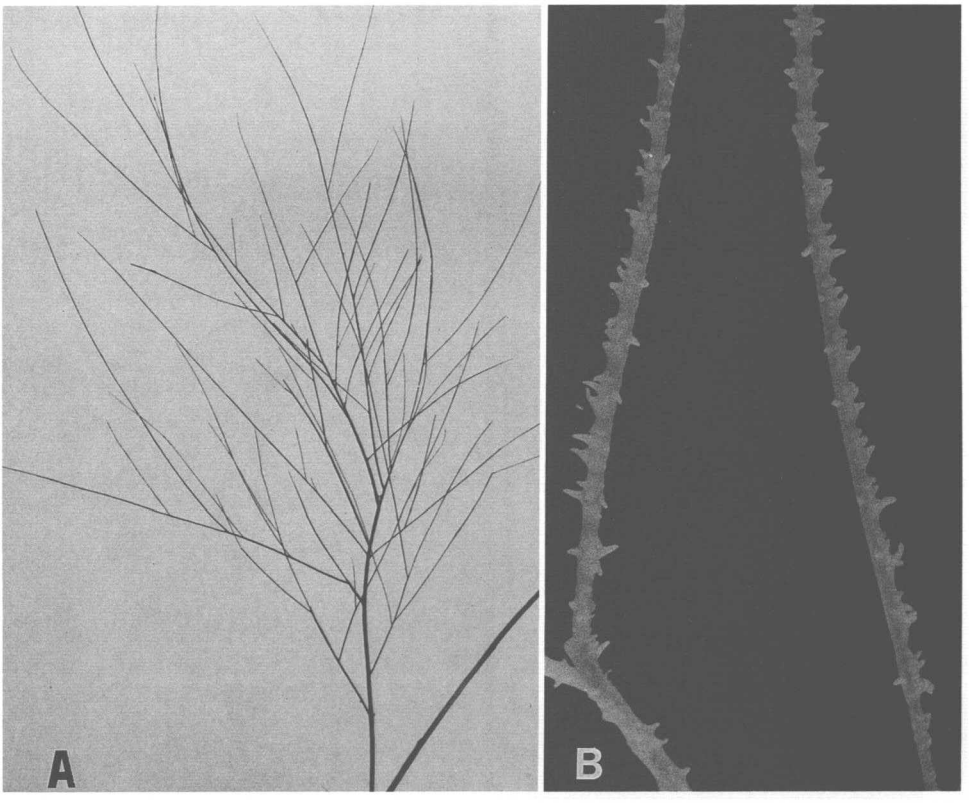

Figure 2. *Antipathes caribbeana*, holotype (USNM 94387): A, upper section of corallum showing the arrangement of the branchlets; B, branchlet with polyps, approx. ×6.

per centimeter in each row. On lower order branches arrangement of primary spines in axial rows often obscured by presence of numerous secondary spines.

Polyps (Fig. 2B) small, rectangular, about 1.0 mm in transverse diameter and separated by interpolypar space of 0.3–0.5 mm. Polyps on branchlets arranged uniserially with 6–10 per centimeter. Polyps on larger branches and stem distributed less regularly, sometimes occurring on all sides of axis.

Description of Holotype.—Corallum about 1.2 m in height; diameter of stem near base about 6 mm (specimen possibly only a branch from a larger colony). Branching dense and irregular to the 10th order or more. Highest order branchlets (those without subbranchlets) thin, straight or slightly curved (Fig. 2A), usually 5–11 cm in length (average 6.9 cm, N = 15; maximum 13 cm), mostly 0.15–0.30 mm in diameter (excluding spines), and 0.2–2 cm apart (average 1.2 cm, N = 28). Branches and branchlets occurring on all sides of lower order branches, but sometimes following a uniserial pattern over short distances. Distal branch angles typically 30–45° but occasionally larger. Central axial canal of branchlets 0.10–0.12 mm in diameter.

Polypar spines uniform in size at specific points on branchlets but varying in size from branchlet to branchlet (Figs. 3A–C, 4A, B); 0.08 to 0.16 mm (as measured from apex to midpoint of base) on branchlets 0.2–0.3 mm in diameter; 0.10–0.14 mm on branches >0.3 mm. Abpolypar spines mostly 0.08–0.10 mm.

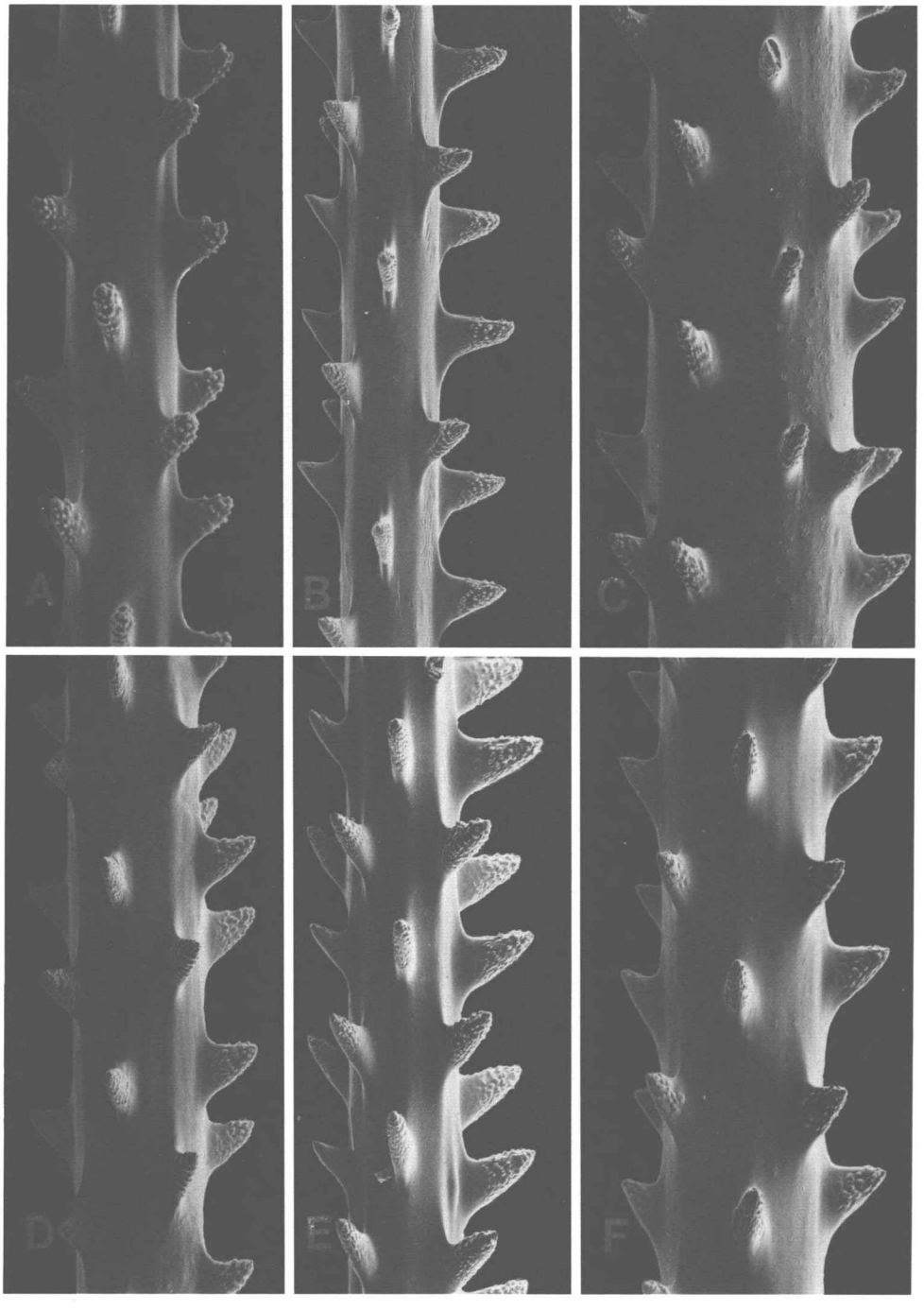

Figure 3. *Antipathes caribbeana*: A–C, sections of branchlets of holotype (USNM 94387); D, section of branchlet from specimen collected off Buena Ventura, Panama; E, section of branchlet from specimen collected off Mona Id., Puerto Rico; F, section of branchlet from specimen collected off Runaway Bay, Jamaica. All approx. ×93.

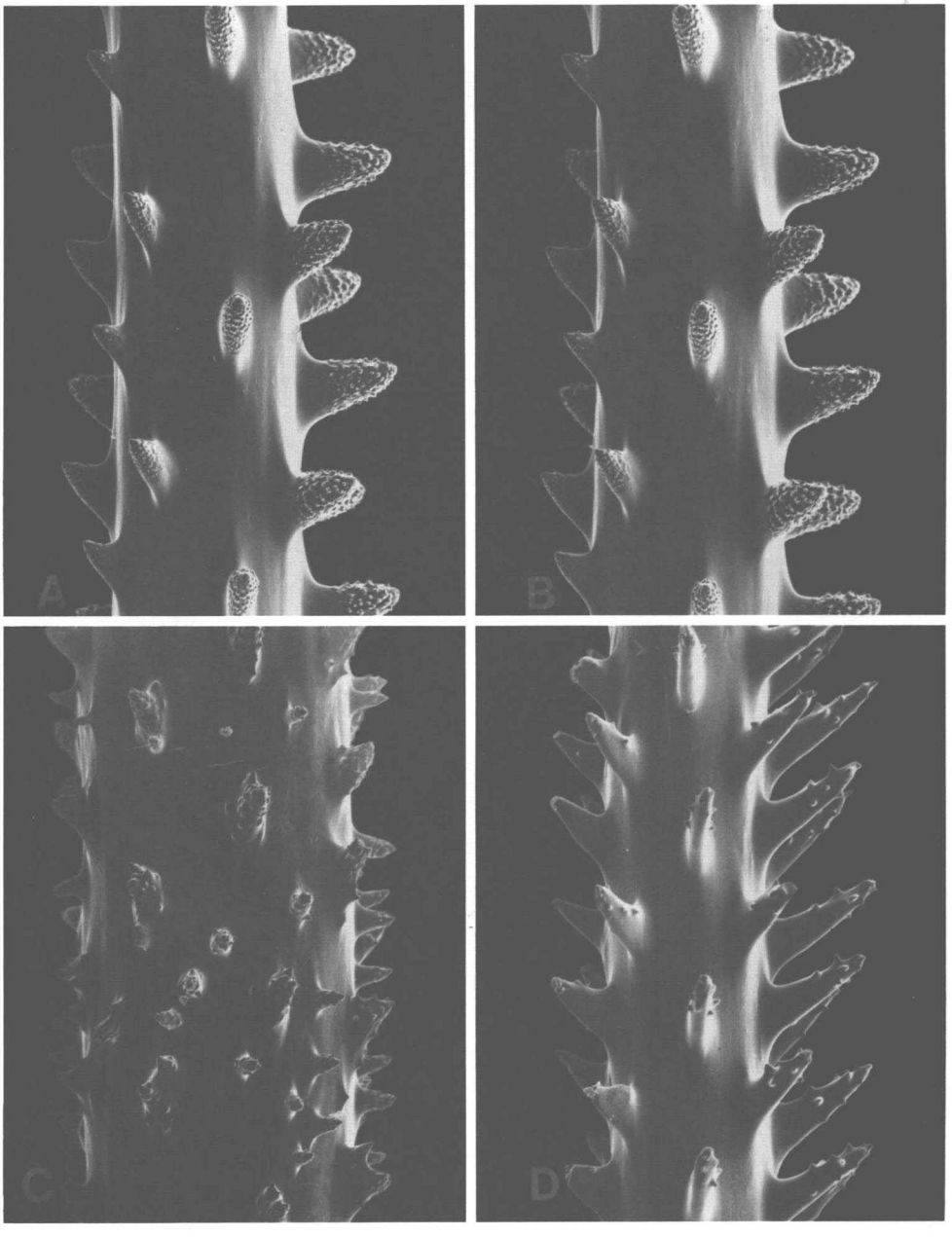

Figure 4. A–C, *Antipathes caribbeana,* holotype (USNM 94387), A and B, section of branchlet, stereo pair, ×89; C, section of branch with secondary spines, ×68; D, *Antipathes salix* Pourtales, holotype (Blake Stn. 171), section of branchlet, ×87.

Polypar spines at tips of highest order branchlets triangular in lateral view, strongly compressed laterally; apex acute. Largest polypar spines about 0.16 mm, subcylindrical, only slightly compressed laterally, and with rounded apex (Figs. 4A, B, 5C).

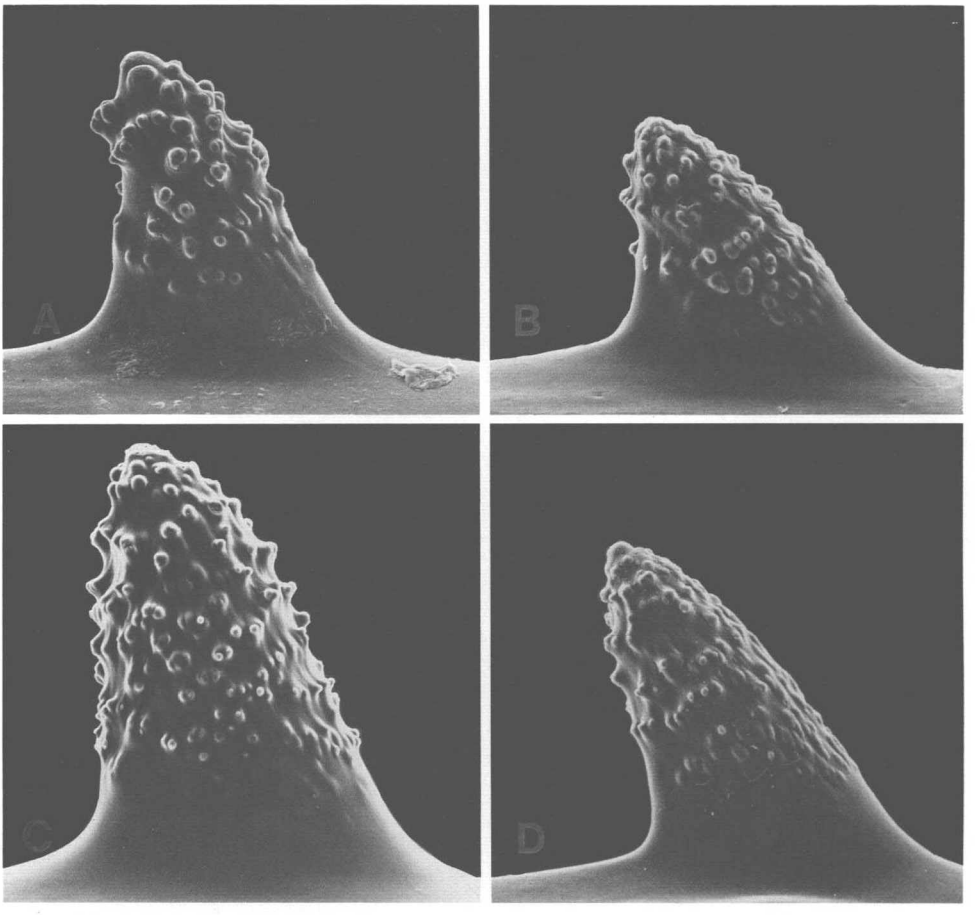

Figure 5. *Antipathes caribbeana*: A, spine of holotype (USNM 94387). B, spine of specimen collected off Buena Ventura, Panama; C, spine of holotype (USNM 94387); D, spine of specimen collected off Mona Id., Puerto Rico. All approx. ×408.

Secondary spines developing on branches 0.4 to 1.0 mm in diameter (Fig. 4C). Secondary spines originating from axial surface or from sides or edges of primary spines, causing primary spines to appear bifid or trifid. Spines on larger branches uniform in size, usually smaller than largest branchlet spines, distally inclined, and acute.

Tubercles on polypar spines very pronounced, cone-shaped or knob-like; largest about 0.004 mm in diameter at base and 0.005 mm high (Fig. 5C). Tubercles sometimes more strongly developed near apex along distal edge of polypar spines (Figs. 3A, 5A), but usually reduced and less numerous on abpolypar spines.

Spines on branchlets arranged regularly in rows extending in same direction as axis of branchlet. Five to 8 (usually 6–7) rows of complete spines (with bases of spines visible) seen in lateral view. Total of 9 to 11 rows of spines on branchlets 0.26–0.54 mm in diameter. Spines spaced 0.35–0.40 mm apart; 25–35 per centimeter in each row.

Polyps on holotype about 1.0 mm long in transverse diameter (from distal border of distal lateral tentacles to proximal border of proximal lateral tentacles),

separated by space of 0.3–0.5 mm (Fig. 2B). Polyps arranged uniserially with 6-8 polyps per centimeter. Polyps on larger branches distributed irregularly and often occurring on all sides of axis.

Remarks.—As is the case for many species of antipatharians, the size, shape, and orientation of the skeletal spines varies at different locations on the corallum. Although the size of the spines increases from the tip of the highest order branchlets proximally, the size may differ substantially on branchlets having the same diameter. In addition, spines that form on regenerating branchlets are usually larger and more robust than those on unbroken branchlets of a similar size. There is, however, a general pattern in the types of spines occurring on different parts of the corallum. Small, strongly compressed, triangular spines are found at the tips of the branchlets; large, slightly compressed, conical to subcylindrical spines are typical of the mid and lower parts of the branchlets; narrow, conical, acute secondary spines appear among the primary spines on many smaller branches; and distally inclined, acute, conical spines are typical of the lower order branches.

Although many of the specimens examined resemble the holotype in most skeletal characters, some specimens differ in the size of the spines. In the holotype the typical size of the polypar spines on the branchlets is 0.11–0.14 mm; however, in some specimens the polypar spines are consistently larger, whereas in others they are consistently smaller. For example, in a specimen collected off Cozumel, Mexico, and in another collected off Puerto Rico, the polypar spines are regularly 0.14–0.16 mm. In contrast, in a specimen from Panama and several from Jamaica, the polypar spines are mostly 0.08–0.10 mm and only rarely as much as 0.12 mm (Figs. 3D, 5B). Colonies with small spines tend to have smaller and fewer tubercles on the spines as well as a greater polyp density (i.e., 8–10/cm compared with 6–8/cm for the typical condition represented by the holotype). However, this pattern is not consistent for all the colonies examined and, in fact, the Cozumel specimen with large spines was found to have 8–10 polyps/cm. These differences may be due to the overall size and age of a colony or to local ecological conditions. It should be noted that in many of the specimens examined polyps were absent, and in others it was difficult to determine if the specimen was a young colony or only a branch from a much larger colony. Consequently, in those cases an evaluation of the relationship between polyp and spine size and colony size or age was not possible.

In in situ photographs of living specimens of *A. caribbeana* the colonies appear orange-brown in color, and when expanded, the sagittal tentacles appear longer than the lateral tentacles (see Humann, 1993).

Comparisons.—In the general appearance of the corallum *Antipathes caribbeana* resembles *A. salix* Pourtalès. Both species form densely and irregularly branched colonies with relatively straight end branchlets and tuberculate spines. The two species can be differentiated, however, by the fact that in *A. salix* the spines are larger (polypar spines mostly 0.2–0.22 mm, abpolypar spines 0.13 mm), narrower, and have fewer tubercles (Fig. 4D, see also Opresko, 1972).

In terms of the shape and appearance of its skeletal spines, *A. caribbeana* resembles the Atlantic species *Stichopathes lutkeni* (Brook, 1899), particularly those colonies of *caribbeana* having very large coarsely tuberculate spines. In addition, the polyps of both species are morphologically alike especially in having relatively long sagittal tentacles. Although the species are very different in growth form (*S. lutkeni* colonies are unbranched), the similarities in the characteristics of the spines and polyps suggest a possible natural relationship.

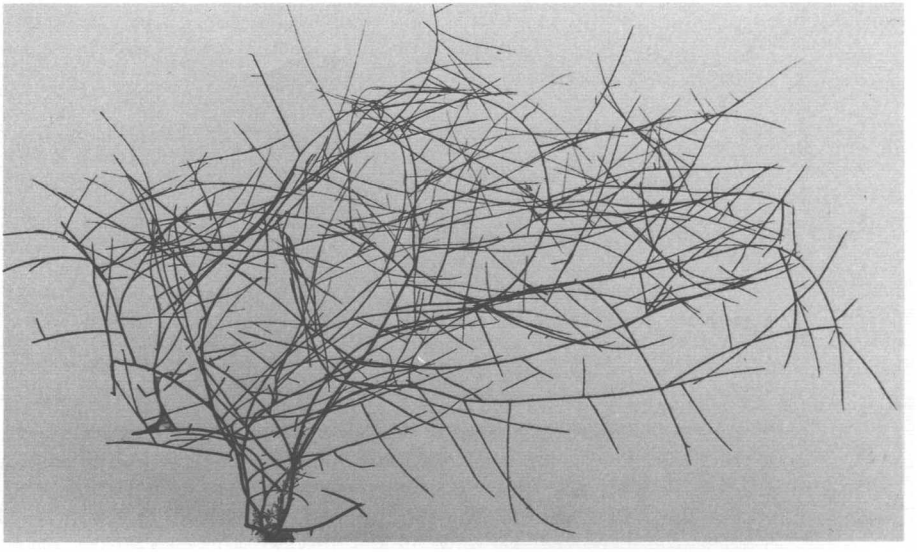

Figure 6. *Antipathes umbratica,* holotype (USNM 94388), corallum, height 21 cm, width 27 cm.

Ethymology.—From Caribbean + the Latin adjectival suffix *ana* in allusion to the Caribbean distribution of the species.

Distribution.—Western Atlantic; in the Caribbean region from Colombia to the Bahamas, Jamaica, Puerto Rico and throughout the Greater and Lesser Antilles, but not yet recorded from the coast of Florida or the Gulf of Mexico (Cairns et al., 1993).

Bathymetric Range.—Antipathes caribbeana is usually found on deep reefs and at the edge of the dropoff at depths ranging from 30 to 60 m; however, it has also been found as shallow as 11 m in Panama, and at greater than 100 m in the Bahamas.

Antipathes umbratica new species
Figures 6, 7

Holotype.—USNM 94388, Bahamas, off Eleuthera, 100 ft (30.5 m), J. Bunt, Oct. 29, 1972.

Paratypes.—USNM 92274, Honduras, off Isla de Roatan, 25 m, P. H. Humann, July 1962, 1 spec.—Bahamas, off Eleuthera Pt, Exuma Sound, 125 ft (on roof of cave), W. Goldberg, Sept., 1972, 1 spec. (RSMAS).

Diagnosis.—Colony generally low and spreading, 20 cm or more in height, sparsely and irregularly branched to 6th order or more; no single distinct stem. Branches and branchlets straight, stiff, up to 15 cm long, and mostly 0.5–1.0 cm apart; distal branch angles usually greater than 75°.

Spines triangular in side view, acute, laterally compressed, and covered over apical half of surface with very small tubercles. Polypar spines on branchlets usually 0.14-0.18 mm, but up to 0.24 mm in places (as measured from apex to midpoint of base); abpolypar spines about 0.1 mm. Spines arranged regularly in 8–10 rows.

Polyps about 1 mm in transverse diameter (from distal border of distal lateral

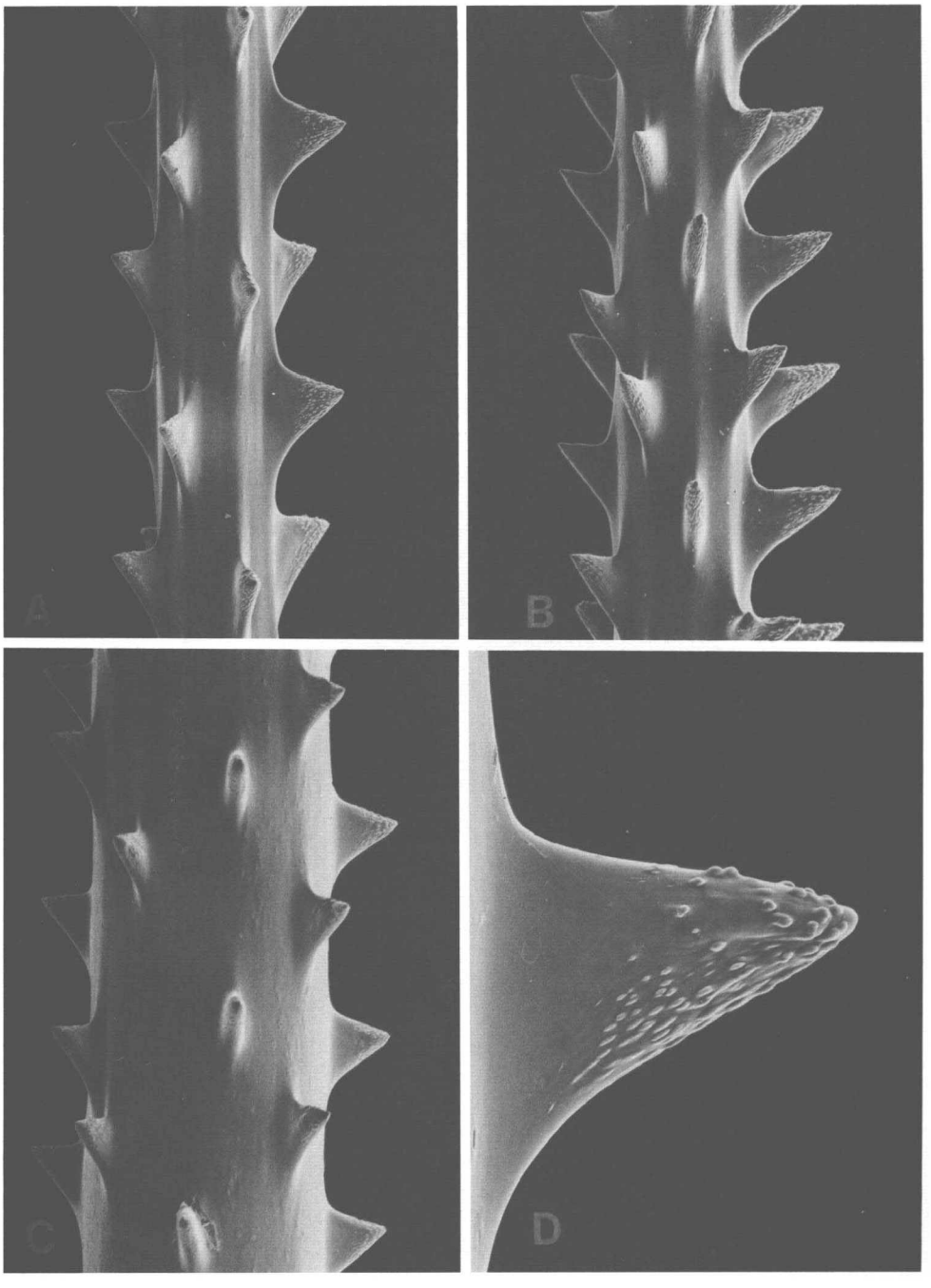

Figure 7. *Antipathes umbratica,* holotype (USNM 94388): A, upper section of branchlet, ×89; B, midsection of branchlet, ×87; C, section of branch, ×69; D, spine from branchlet, ×359.

tentacles to proximal border of proximal lateral tentacles); interpolypar space about 0.5 mm. Polyps arranged in single row, with 6–7 per centimeter.

Description of Holotype.—Corallum approximately 21 cm high, 27 cm wide, and 3 cm thick (Fig. 6). Trunk absent; two major branches and one smaller broken branch arising directly from basal plate at wide angles with each other. Lowermost secondary branches occurring in nearly opposite pairs about 2 mm above base of two primary branches. Corallum branched mostly to 4th or 5th order and rarely to 6th order. Lower order branches up to 15 cm long and about 1–1.2 mm in diameter at their base. Branchlets straight, stiff, and standing out at wide angles from lower order branches. Distal branch angles mostly 75–90° (range 65–105°). Smallest branchlets 1.5–5.0 cm in length and 0.36–0.52 mm in diameter (0.1–0.26 mm excluding spines). Branchlets generally arranged bilaterally along lower order branches, but not equidistant from one another. Adjacent branchlets on opposite sides of lower order branch sometimes much closer together (1–2 mm) than adjacent branchlets on same side of branch (5–20 mm apart). Central axial canal about 0.1 mm in diameter on branchlet 0.14 mm in diameter (excluding spines).

Axial spines on holotype triangular, laterally compressed, with acute apex, and covered over apical half of surface with very small tubercles (Fig. 7A–D). Tubercles knob-like and rounded near apex of spines, more flattened and elongate basally. Tubercles often occurring further down along proximal than distal edge of polypar spines (Fig. 7D).

Spines on distal end of branchlets about as wide at their base as they are tall (Fig. 7A). At midpoint of branchlets, spines usually taller than they are wide at base and polypar spines larger than abpolypar spines. On branchlets 0.2 mm in diameter, polypar spines 0.14–0.16 mm (from apex to middle of the base) and abpolypar spines about 0.10 mm (Fig. 7B). On lower order branches, polypar spines 0.10–12 mm (Fig. 7C).

Spines arranged in rows along the length of branchlets and branches. Spines offset from those in adjacent rows. Distance between adjacent spines within each row 0.40–0.50 mm. Five or six rows of spines visible in lateral view (base of spines can be seen). Eight rows of spines present around entire circumference of branchlet 0.18 mm in diameter; 9 rows on branchlet 0.4 mm in diameter, and 10 rows on branch 0.7 mm in diameter.

Polyps distributed in one row usually on lateral or upper surface of branchlets. Polyps generally face out on one side of corallum. Polyps 0.9–1.2 mm in transverse diameter (from distal side of distal lateral tentacles to proximal side of proximal lateral tentacles). Space between adjacent polyps 0.4–0.8 mm. Six to 7 polyps per centimeter on branchlets.

Remarks.—The corallum of the specimen from Exuma Sound, Bahamas, which was collected from the roof of a cave, is low and spreading and lacks a major stem. It is 15 cm high, about 30 cm wide, and 5–8 cm thick. The branchlets on this specimen appear slightly thicker than those on the holotype and this is due, in part, to the fact that the polypar spines are larger (usually 0.14–0.18 mm, but up to 0.24 mm in places). The spines on branches near the base are about 0.12 mm and more needle-like than those in the holotype. The specimen from Honduras (USNM 92274) consists of several broken branches with no defined stem. As in the holotype, the branchlets are not arranged in a strictly regular pattern; in places they follow a uniserial order (up to six in a row) and in others they follow a bilateral pattern. The polypar spines in this specimen are mostly 0.14–0.16 mm, but range in size from 0.12 mm to 0.22 mm. The specimen is dry and

the polyps are not well preserved; however, they appear to be about 1.3 mm in transverse diameter.

In the holotype, the dried tissue has retained some pigment indicating that polyps were dark red or reddish-brown when alive. The specimen from Honduras was photographed in situ (Humann, 1993) and the photo shows the polyps to be white with perhaps a slight trace of yellow.

Comparisons.—There are no other described species from the Caribbean region or from the western Atlantic that resemble *Antipathes umbratica* new species both in the growth form of the corallum and in the size and shape of the spines. *Antipathes nilanduensis* and *A. irregularis* from the Indian Ocean (Cooper, 1903, 1909) and *A. grandiflora* Japan (Silberfeld, 1909) are similar to *umbratica* in the general appearance of the corallum (i.e., small, irregularly branched colonies with branchlets forming very wide angles with the lower order branches); however, from the limited descriptions of those species, it appears that they have larger polyps (about 2 mm) and smaller spines. The descriptions are insufficient to determine if the spines are smooth or tuberculate. The open branching pattern of *A. lentipinna* Brook is also similar to that of *A. umbratica*; however, *lentipinna* forms very large colonies with long branchlets. The polypar spines are similar to those of *umbratica* in size and are finely papillose, but they are also often split into multiple points (observations made on samples of the type specimen of *lentipinna*); a condition not observed in *umbratica.*

Ethymology.—From the Latin "umbratica," of the shadows, referring to the association of this species with caves and the underside of ledges.

Distribution.—Bahamas and Honduras.

Bathymetric Range.—From about 25 to about 40 m; most likely to be found in caves and under ledges.

Acknowledgments

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ADDRESS: *Health Sciences Research Division, Oak Ridge National Laboratory, 1060 Commerce Park, Oak Ridge, Tennessee 37830.*